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Sebastien Joseph Roy

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EXAMINER

NGUYEN, DUC M

ART UNIT

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2618

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |                                      |  |  |
|------------------------------|--------------------------------------|--|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/587,701 | <b>Applicant(s)</b><br>ROY, SEBASTIEN JOSEPH |  |
|                              | <b>Examiner</b><br>DUC M. NGUYEN     | <b>Art Unit</b><br>2618                      |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 8 and 17 is/are allowed.
- 6) ☒ Claim(s) 1,2,4,5,7,9-11,13,14 and 16 is/are rejected.
- 7) ☒ Claim(s) 3, 6, 12, 15 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>4/24/07</u> . | 6) <input type="checkbox"/> Other: ____.  |

## **DETAILED ACTION**

### ***Information Disclosure Statement***

1. The references listed in the information disclosure statements submitted on 4/24/07 has been considered by the examiner (see attached PTO-1449).

### ***Claim Objections***

2. Claims 10, 15 are objected to because of the following informalities:
  - As to claim 10, "if" should be changed to "of" in the line before the last line of the claim on page 5;
  - As to claim 15, insert "to" after "according" in line 1 of the claim.
  - As to claim 15, insert "the updating parameters comprise" after "wherein" in line 1 of the claim.
- . Appropriate correction is required.

### ***Claim Rejections - 35 USC 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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4. Claims **1, 9, 10** are rejected under 35 U.S.C. 103(a) as being unpatentable by **Li et al** (US 2004/0146024), hereafter **Li'024** in view of and **Li et al** (US Pat. Number **6,795,392**), hereafter **Li'392**.

Regarding claim **1**, **Li'024** discloses

an array receiver for processing signals received from a plurality of transmitting users via an array antenna having an array of N antenna elements providing a set of antenna signals, each comprising information from each user, wherein said receiver has a common preprocessing section for sampling each of the antenna element signals as claimed (see Fig. 2 regarding input signals  $i[n]$  from M antennas and [0022] regarding sampled process), and

processing the samples of at least some of said antenna signals  $i[n]$  to form a plurality of basis signals  $d[n]$  together having **fewer** space-time dimensions than the space-time dimensions of the combined antenna signals (see Fig. 2 regarding output signals  $d[n]$ ), wherein one skilled in the art would recognize that the number of antennas can be more or less regardless of the number of users as disclosed by **Li'392** (see col. 3, lines 20-24 regarding one or many antennas), and

a plurality of signal processing units (joint detectors JD) each having a plurality of inputs coupled to the common preprocessing section for receiving all of the basis signals, each processing unit processing and combining said basis signals to produce a respective one of a set of estimated received signals each for a corresponding desired one of the users (see Fig. 4 regarding output signals  $S[n]$  and [0046 – 0064]),

the common preprocessing section comprising filtering means for combining all of the antenna signals  $X_i$  to provide said plurality of basis signals  $d[i]$ , each of the basis signals comprising a different combination of the antenna signals, each of the signal processing units combining the basis signals to provide a user-specific output signal  $S[i]$  (see Fig. 3 and [0038 – 0045]), and

updating means for periodically updating parameters of the filtering means used for deriving each particular basis signal such that each user-specific output signal will exhibit a desired optimized concentration of energy of that desired user's received signal as received by the array antenna (see [0033-0048], noting for “maximum signal energy” in [0038]).

Therefore, by simply providing a large number of antennas with a smaller number of detected user (i.e,  $M \text{ antennas} > N \text{ users}$ ), claimed limitation are made obvious by Li'024 in view of Li'392.

Regarding claims **9, 10**, the claims are interpreted and rejected for the same reason as set forth in claim 1 above.

5. Claims **1-2, 4-5, 7, 9-11, 13-14, 16** are rejected under 35 U.S.C. 103(a) as being unpatentable by **Huang** (US Pat. Number **6,301,293**) in view of **Hara** (US Pat. Number **6,934,323**) and **Li et al** (US Pat. Number **6,795,392**), hereafter **Li'392**.

Regarding claim **1**, **Huang** discloses

an array receiver for processing signals received from a plurality of transmitting users via an array antenna having an array of  $P$  antenna elements providing a set of

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antenna signals, respectively, each comprising information from each user, wherein said receiver has a common preprocessing section for sampling each of the antenna element signals (see Figs. 3, 7 regarding signals  $r_1$  to  $r_p$  and detector 16), where one skilled in the art would recognize that the receiver in **Huang** would sampling each of the antenna element signals in the similar way as mentioned by **Hara** (see col. 2, lines 44-51 and col. 6, lines 51-53 regarding the sampling process for baseband signals), and

processing the samples of at least some of said antenna signals to form a plurality of basis signals together having **fewer** space-time dimensions (i.e,  $k$  users) than the space-time dimensions (i.e,  $p$  antennas) of the combined antenna signals (see **Huang**, Figs. 3, 7 regarding output signals  $y_{con}$  from the detector 16 which would read on the claimed "basis signals  $y$ "), wherein one skilled in the art would recognize that the  $p$  number of antennas can be selected for any arbitrary number regardless of the desired  $k$  number of users (i.e,  $p > k$  or  $p < k$ ) in the similar way as mentioned by **Li'392** (see col. 3, lines 20-24 regarding the selection of one or many antennas), and

a plurality of signal processing units each having a plurality of inputs coupled to the common preprocessing section for receiving all of the basis signals, each processing unit processing and combining said basis signals to produce a respective one of a set of estimated received signals, each for a corresponding desired one of the users (see Huang, Figs. 3, 7 regarding linear combiner matrix  $W_A$  and estimated signals  $b_k^A$  for  $K$  users),

the common preprocessing section comprising filtering means for combining all of the antenna signals to provide said plurality of basis signals (see **Huang**, Figs. 3, 7,

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regarding detector 16 comprising matched filters 10 and weighted channel coefficient vectors  $h$ ,  $c$ . See also **Hara**, Fig. 2 regarding weighted vector  $W$ ), each of the basis signals comprising a different combination of the antenna signals, each of the signal processing units combining the basis signals to provide a user-specific output signal (see Huang, Figs. 3, 7 regarding linear combiner matrix  $WA$ ), and

updating means for periodically updating parameters of the filtering means used for deriving each particular basis signal such that each user-specific output signal will exhibit a desired optimized concentration of energy of that desired user's received signal as received by the array antenna (see **Huang**, col. 5, line 42 – col. 6, line 35 regarding detector 16 and col. 7, lines 15 – 43, wherein it is clear that the MMSE criterion would obviously exhibit a desired optimized concentration of energy of that desired user's received signal).

Therefore, the claimed limitations are made obvious by **Huang** in view of **Hara** and **Li**.

Regarding claim **2**, **Huang** would teach a receiver according to claim 1, wherein the updating means comprises means for adjusting said parameters in dependence upon channel characteristics of all user channels (see **Huang**, col. 5, lines 42-50 regarding weighted/coefficients  $h^{\wedge}$ ,  $c^{\wedge}$ , that would obviously be updated in the similar way as of the updating of eigenvector in **Hara**, see col. 11, lines 1-5, which clearly suggest that the eigenvector/weight is updated for every sampling period in dependence upon channel characteristics of all user channels with the correlation matrix  $\Phi$ ).

Regarding claim **4**, **Huang** would teach the number of basis signals is equal to the number of desired user signals (see Figs. 3, 7).

Regarding claim **5**, the claim is rejected for the same reason as set forth in claim 1 above. In addition, it is clear the common preprocessing section (detector 16 in Fig. 3, 7 of Huang) would comprise (k users) dominant subspace filters and would producing a set of basis signals that would obviously project the input signal of nth user carrying the most energy to the output of the nth basic signal as claimed (i.e, obtained via matched filter and weighted coefficients as an obvious desired result for any filter design intended for a multi-user detection).

Regarding claim **7**, **Huang** would teach a receiver according to claim 1, wherein the filtering means comprises a plurality of filters each comprising a filter matched to a respective one of the desired users (see Fig. 3, col. 7, lines 15-18 regarding matched filters 10).

Regarding claims **9**, **10**, the claims are interpreted and rejected for the same reason as set forth in claim 1 above.

Regarding claims **11**, **13**, **14**, **16**, the claims are interpreted and rejected for the same reason as set forth in claims 2, 4, 5, 7 above, respectively.

#### ***Allowable Subject Matter***

6. Claims 8, 17 are allowed.



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7. Claims 3, 6 would be allowable if rewritten to overcome the objection(s) set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

8. Claims 12, 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

### ***Conclusion***

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

See the attached PTO-892.

10. **Any response to this action should be mailed to:**

Commissioner of Patents and Trademarks

Washington, D.C. 20231

**or faxed to:**

(571) 273-8300 (for **formal** communications intended for entry)

(571)-273-7893 (for informal or **draft** communications).

Hand-delivered responses should be brought to Customer Service Window,  
Randolph Building, 401 Dulany Street, Alexandria, VA 22314.

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Any inquiry concerning this communication or communications from the examiner should be directed to Duc M. Nguyen whose telephone number is (571) 272-7893, Monday-Thursday (9:00 AM - 5:00 PM).

Or to Nay Maung (Supervisor) whose telephone number is (571) 272-7882.

/Duc M. Nguyen/

Primary Examiner, Art Unit 2618

Nov 25, 2008